

CLAIMS

1. Apparatus for use in a wireless transmitter, the apparatus comprising:

a power amplifier (185) for amplifying a radio frequency (RF) signal to provide an RF output signal for transmission; and

5 a predistorter (200) for injecting a distortion signal into the RF signal prior to amplification for use in linearizing the power amplifier;

wherein the predistorter includes a phase shifter (220) operating at less than twice a carrier frequency of the RF signal.

10 2. The apparatus of claim 1, further including a signal path for conveying a clock signal having a frequency less than twice a carrier frequency of the RF signal and wherein the predistorter is in the signal path of the clock signal.

3. The apparatus of claim 2, wherein the phase shifter adjusts a phase of the clock signal and provides a phase-shifted clock signal, and wherein the predistorter further comprises:

a mixer (225) responsive to the phase-shifted clock signal and an intermediate frequency (IF) signal for providing the distortion signal;

20 an amplitude adjuster (235) coupled to the mixer for adjusting an amplitude of the distortion signal before application to the power amplifier;

a directional coupler (215) disposed between the amplitude adjuster and the power amplifier for injecting the distortion signal into the RF signal; and

a processor (290) for controlling the phase shifter and amplitude adjuster such that the distortion signal linearizes the power amplifier.

25

4. The apparatus of claim 3, wherein the processor is a digital signal processor.

5. The apparatus of claim 3, further including an upconverter (170) for converting the IF signal to the RF signal.

30

6. The apparatus of claim 3, further including an amplifier for amplifying the distortion signal before application to the amplitude adjuster.

7. The apparatus of claim 3, wherein the predistorter includes no more than one directional coupler.

8. A circuit board for use in a wireless transmitter, comprising:

5 a power amplifier (185) for amplifying an RF signal and a distortion signal to provide an RF output signal for transmission, where the RF signal has a carrier frequency; and

a phase shifter (220) for receiving a clock signal having a frequency less than twice the carrier frequency and for providing a phase-shifted signal, wherein a change in phase of the phase-shifted signal results in a change in phase of the distortion signal.

10 9. The circuit board of claim 8, further comprising a radio frequency (RF) integrated circuit (IC) (305) for providing the RF signal and the clock signal; and wherein the RF IC is responsive to the phase shifted signal for providing the distortion signal.

15 10. The circuit board of claim 9, further comprising:

an amplitude adjuster (235) for adjusting an amplitude of the distortion signal;

a directional coupler (215) disposed between the amplitude adjuster and the power amplifier for injecting the distortion signal into the RF signal; and

20 a processor (290) for controlling the phase shifter and amplitude adjuster such that the distortion signal linearizes the power amplifier.

11. The circuit board of claim 10, wherein the processor is a digital signal processor.

25 12. The circuit board of claim 10, further including no more than one directional coupler in a circuit path between the power amplifier and the RF integrated circuit.

13. The circuit board of claim 10, further including an amplifier for amplifying the distortion signal before application to the amplitude adjuster.

30 14. Apparatus for use in linearizing a power amplifier of a wireless transmission system, wherein the power amplifier amplifies a radio frequency (RF) signal for transmission, the apparatus comprising:

a source of a clock signal having a frequency less than twice a frequency of the RF signal;

12

a phase shifter responsive to the clock signal for providing a phase-shifted clock signal;

a distortion generator responsive to the phase-shifted clock signal for providing a distortion signal;

5 an amplitude adjuster responsive to the distortion signal for adjusting an amplitude thereof;

a coupler disposed between the amplitude adjuster and the power amplifier for injecting the distortion signal into the power amplifier; and

10 a controller for controlling the phase shifter and the amplitude adjuster such that the distortion signal coupled into the power amplifier linearizes the power amplifier.

15. The apparatus of claim 14, wherein the phase shifter is coupled to the source via a signal path, which conveys the clock signal.

15 16. The apparatus of claim 14, further including an amplifier for amplifying the distortion signal before application to the amplitude adjuster.

17. A method for use in linearizing a power amplifier of a wireless transmission system, the method comprising:

20 providing a carrier signal;

mixing the carrier signal with an intermediate frequency (IF) signal to provide a distortion signal;

injecting the distortion signal into a radio frequency (RF) signal;

25 operating an amplifier in a non-linear region for amplification of the RF signal to provide an RF output signal; and

adjusting a phase of the carrier signal and an amplitude of the distortion signal for linearizing the amplifier.